federal register

FRIDAY, AUGUST 15, 1975

PART IV:

ENVIRONMENTAL PROTECTION AGENCY

Water Programs and Domestic Wastewater Disinfection

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SECONDARY TREATMENT AND TREATMENT INFORMATION

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 133]

[FRL 396-5]

WATER PROGRAMS

Secondary Treatment Information

The Environmental Protection Agency is considering the amendment of the Secondary Treatment Information regulation contained in 40 CFR-Part 133 and promulgated pursuant to Sections 304 and 301 of the Federal Water Pollution Control Act Amendments of 1972 (the Act). Section 304(d)(1) requires that the Environmental Protection Agency publish information on the degree of effluent reduction attainable through the application of secondary treatment within sixty days after enactment of the Act and from time to time thereafter. Section 301 (b)(1)(B) of the Act requires that effluent limitations, based on secondary treatment, be achieved for all publicly owned treatment works in existence on July 1, 1977, or approved for a construction grant prior to June 30, 1974 (for which construction must be completed within four years of approval). Secondary Treatment Information was promulgated on August 17, 1973.

Historically, treatment processes have been grouped together as "primary" or "secondary" based on the pollutants removed and the means by which pollutant removal is accomplished. The concept of "secondary treatment" grew out of the need to develop wastewater treatment processes which provided for the reduction of pollutants not effectively removed by the liquid-solids separation techniques associated with "primary" treatment. Secondary treatment processes were developed to biologically remove degradable organic materials from wastewater. The term "secondary treatment" eventually became synonymous with the biological treatment of wastewater for the removal of carbonaceous organic material. Only recently have physical/chemical treatment processes been developed which parallel the organic removals achieved by the application of biological secondary treatment.

Biological secondary treatment processes, as well as comparable physical/chemical treatment processes, accomplish a certain degree of reduction in the number of pathogenic organisms found in domestic wastewater (as normally indicated by the level of fecal coliform bacteria) through natural die-off and solids removal. These removals, however, are incidental and generally result in fecal coliform bacteria concentrations which are at least an order of magnitude greater than those required for secondary treatment by 40 CFR Part 133.

The reduction of pathogens beyond that achieved by process operation for the removal of degradable organic matter is often necessary for the protection of public health. Section 133.102 (c) of 40 CFR Part 133 established effluent limitations for fecal coliform bacteria based on the levels attainable by means of disinfection with disinfectants such as chlorine. The minimum levels of disinfection required by § 133.102(c) in terms of fecal coliform bacteria are as follows:

(1) The geometric mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 200 per 100 milliliters;

(2) The geometric mean of the values for effluent samples collected in a period of seven consecutive days shall not exceed 400 per 100 milliliters.

In the case of most facilities treating domestic wastes, attainment of the levels of fecal coliform bacteria required by 40 CFR Part 133 necessitates the use of a separate, non-biological unit process designed specifically for the disinfection of wastewater. The only wastewater disinfection processes currently available for widespread use of publicly owned treatment works are those employing molecular chlorine or its derivatives. The net result is that the requirement of a minimum level of disinfection for all publicly owned treatment works in 40 CFR Part 133 inadvertently encourages the use of chlorine at the present time. This problem is compounded by the fact that requiring a minimum level of disinfection for all sanitary wastewater discharges is of questionable benefit in those instances where the possibility of human contact with the receiving body is remote. While it is acknowledged that considerable benefits are gained by the disinfection of wastewater, it also must be recognized that certain potential environmental problems can result from the uncontrolled use of chlorine.

In January 1974 an Environmental Protection Agency Task Force was formed to review EPA policy on wastewater disinfection and the use of chlorine. Since that time a considerable amount of data has been gathered and analyzed. Evidence exists that residual chlorine and certain chlorine-based compounds. formed as a result of the chlorination of domestic wastewater can be toxic to aquatic life in relatively low concentrations. It has been recently documented that chlorination may form carcinogenic compounds in secondary effluents. Disinfectants are by definition materials which are hazardous to living things. Because of the potential dangers associated with the use of molecular chlorine, many municipalities have switched to sodium hypochlorite for disinfection because it is less hazardous to handle than molecular chlorine though considerably more expensive. The storage and/or-application of other disinfectants also requires special safety precautions similar to those for chlorine. The Task Force has concluded that the potential harm to both the human and aquatic life which can result from the uncontrolled and excessive use of chlorine for wastewater disinfection warrants the amendment of 40 CFR Part 133. A preliminary copy of the Task Force report is available for inspection at the EPA Freedom of Information Center, Room 202, West Tower, Waterside Mall in Washington, D.C. and at all EPA Regional Offices. A limited number of copies of the preliminary report are available. Persons wishing to obtain a copy may write the Director, Municipal Construction Division, Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460. The Task Force Report will be finalized upon completion of the proposed action and will be available from the U.S. Government Printing Office at that time.

The costs and energy requirements associated with wastewater treatment are also factors which are significantly influenced by the imposition of disinfection requirements. Presently the cost of disinfection (chlorination) is approximately 5–7 percent of the total treatment costs for secondary treatment. The imposition of requirements which would necessitate the use of alternate means of disinfection (e.g., ozonation or dechlorination) could increase the total treatment cost (secondary treatment) by as much as 15–30 percent.

Disinfection, even at the present required level, is energy intensive because of the amount of energy required for the manufacture of most disinfectants. The energy used to produce the amount of the chlorine necessary to provide the level of disinfection presently required by 40 CFR Part 133 is from 7–15 percent of the total on-site energy demand of a typical secondary treatment plant (activated sludge). Furthermore, the energy requirements for the manufacture of alternate disinfectants are as much as 5–7 times as great as those for chlorine.

It is not intended to imply that energy and cost are factors which are to be considered in establishing specific disinfection requirements. Public health and protection of the aquatic and human environments are still the overriding considerations affecting and disinfection requirements. The unnecessary and excessive use of disinfectants, however, is wasteful, both in terms of available financial resources and energy.

It is proposed that the effluent limitations for fecal coliform bacteria in 40 CFR Part 133 be deleted from the definition of secondary treatment. Disinfection requirements for publicly owned treatment works and other domestic wastewater treatment plants (for which effluent limitations have been based on secondary treatment information) would be established in accordance with water quality standards promulgated pursuant to Sections 301, 302 and 303 of the Act. Sections 301(b)(1)(B) and 301(b)(1)(C) of the Act require for all publicly owned treatment works "effluent limitations based on secondary treatment," or "any more stringent limitation including those necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations * * *." Effluent limitations for publicly owned treatment works, including disinfection requirements, pursuant to Section 301 of the Act are and will continue to be enforceable conditions of permits issued under the authority of the National Pollutant Discharge Elimina-

tion System. It is expected that most facilities with disinfection capabilities will continue to disinfect, with exceptions to the continuous disinfection requirement being made on a case-by-case basis in accordance with water quality standards and any applicable State regulations. It is also expected that disinfection equipment will be installed in most new facilities and in those existing facilities with specific disinfection requirements which do not presently have disinfection capabilities. A supplementary statement of EPA policy on the disinfection of wastewater has been prepared and is being published in the FEDERAL REGISTER concurrently with this notice.

In this regard it also recognized that many States have previously developed regulations concerning wastewater disinfection practices which are based on the specific needs of the particular State. These programs have proven to be effective with respect to protecting public health from disease and are the basis for the Agency's confidence that the proposed amendment will have the desired effect without jeopardizing public health. The States are encouraged to retain existing programs when such programs have proven effective for that State's needs provided that disinfection criteria are based on water quality standards. In those instances in which state water quality standards had relied on the fecal coliform bacteria limitations in 40 CFR Part 133 to provide a minimum level of disinfection for all discharges from publicly owned treatment works, such standards should be re-evaluated and amended if determined to be inadequate with respect to protection of public health from disease.

Paragraph (d) of § 133.102 requires that "the effluent values for pH shall remain within the limits of 6.0 to 9.0." This limitation was not intended to require that the effluent pH be adjusted to conform with the 6–9 range when the natural pH of the wastewater and/or natural biological treatment phenomena cause the effluent pH to be outside that range. The amendment of § 133.103 ("Special Considerations") is proposed to limit the applicability of § 133.102(d) to those cases where inorganic chemicals are added during the wastewater treatment process prior to disinfection or where contributions from industrial sources cause the effluent pH to be greater than 9.0 or less than 6.0.

Interested persons are invited to comment on the proposed amendments to Part 133 by written submission to the Office of Water Program Operations (WH–447), United States Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460. Prior to promulgation of the proposed amendments in final form, all comments received on or before October 14, 1975 will be carefully considered. All comments received may be inspected at the above location during normal working hours by interested members of the public. If, during the period for written submissions, it is deemed necessary that public hearings be held, notice of such hearings will be published in the FEDERAL REGISTER.

In consideration of the foregoing, it is proposed to amend Part 133 of Chapter I of Title 40 of the Code of Federal Regulations as set forth below.

(Sec. 304(d)(1) and 301(b)(1)(B) of the Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. 1342, 1345 & 1361))

Dated: August 6, 1975.

JOHN QUARLES,
Acting Administrator.

1. Section 133.102 is revised to read as follows:

§ 133.102 Secondary Treatment.

The following paragraphs describe the minimum level of effluent quality attainable by secondary treatment in terms of the parameters biochemical oxygen demand, suspended solids and pH. All requirements for each parameter shall be achieved except as provided for in § 133.103.

(a) *Biochemical oxygen demand (five-day).* (1) The arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 30 milligrams per liter.

(2) The arithmetic mean of the values for effluent samples collected in a period of seven consecutive days shall not exceed 45 milligrams per liter.

(3) The arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85 percent removal).

(b) *Suspended Solids.* (1) The arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 30 milligrams per liter.

(2) The arithmetic mean of the values for effluent samples collected in a period of seven consecutive days shall not exceed 45 milligrams per liter.

(3) The arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85 percent removal).

(c) *pH.* The effluent values for pH shall remain within the limits of 6.0 to 9.0.

2. Section 133.103 is amended by adding paragraph (c) as follows:

§ 133.103 Special considerations.

* * * * *

(c) The requirements of paragraph (c) of § 133.102 are intended to control the pH of effluents discharged from treatment works which add inorganic chemicals to the waste stream as part of a treatment process or where the effluent pH falls outside of the 6–9 range because of contributions from industrial sources. The effluent pH limitations are not intended to require pH adjustments to effluents from strictly physical/biological treatment processes followed by disinfection. Mandatory adjustment of effluent pH to conform to the 6–9 range shall be limited to those cases where inorganic chemicals are added to the wastewater prior to disinfection and where contributions from industrial sources cause the effluent pH to be less than 6.0 or greater than 9.0.

[FR Doc.75–21369 Filed 8–14–75;8:45 am]

ENVIRONMENTAL PROTECTION AGENCY

[FRL 396-6]

DOMESTIC WASTEWATER DISINFECTION

Secondary Treatment

The Environmental Protection Agency has proposed the amendment of the Secondary Treatment Information regulation contained in 40 CFR Part 133 and promulgated pursuant to Section 304(d)(1) of the Federal Water Pollution Control Act Amendments of 1972 (the Act). Section 301(b)(1)(B) of the Act requires the effluent limitations, based on secondary treatment, be achieved for all publicly owned treatment works in existence on July 1, 1977, or approved for a construction grant prior to June 30, 1974 (for which construction must be completed within four years of approval). The proposed amendment, published concurrently with this notification, deletes the fecal coliform bacteria limitations from the definition of secondary treatment.

At the time that 40 CFR Part 133 was first promulgated, limitations on fecal coliform bacteria were included in the definition of secondary treatment on the basis that disinfection is necessary for the protection of public health. In recognition of more recent information, it is now felt that it is environmentally more sound to establish disinfection requirements for domestic wastewater discharges in accordance with water quality standards promulgated pursuant to Sections 302 and 303 of the Act and associated public health needs. In this manner, the necessary protection of public health can be assured, while achieving adequate safeguards against the adverse effects which could result from the excessive use of disinfectants.

In January 1974, an Environmental Protection Agency Task Force was formed to review EPA policy on wastewater disinfection and the use of chlorine. The Task Force recognized that chlorine and chlorine-based compounds are presently receiving essentially exclusive use for the disinfection of wastewater. While chlorine is an effective disinfectant with respect to meeting bacteriological standards and is adequately protecting public health, there are potential dangers associated with the use of chlorine. Disinfection of wastewater with chlorine can result in the formation of halogenated organic compounds which have been identified as potential carcinogens. Considerable data also exist to indicate that chlorination of wastewater can result in a residual chlorine level that is toxic to aquatic life. The Task Force concluded that in view of the fact that present policy inadvertently encourages the use of chlorine, a regulation which in certain instances requires disinfection unnecessarily further compounds the potential problems associated with the chlorination of wastewater.

Prior to the enactment of Pub. L. 92-500, domestic wastewater disinfection practice was, for the most part, controlled locally by the States. In proposing the deletion of the disinfection requirements from 40 CFR Part 133 and recommending reliance on water quality standards, the EPA made an assessment of the State standards relating to wastewater disinfection. It was determined that virtually all of the States and Territories have water quality related regulations pertaining to the disinfection of wastewater and that public health was adequately being maintained. In many instances, other than continuous disinfection was being practiced where the possibility of human contact with the receiving waters was remote.

Disinfection requirements have been and must continue to be directed at protecting the public health. Water quality standards which establish the need for disinfection must, as a minimum, shall include the following:

(1) Protection of public water supplies.

(2) Protection of fisheries and shellfish waters.

(3) Protection of irrigation and agricultural waters.

(4) Protection of waters where human contact is likely.

(5) Protection of interstate waters to which the above criteria apply.

The Agency proposed for public comment on October 18, 1973, Quality Criteria for Water which were intended to be used as the basis for State water quality standards. Criteria were proposed for fecal coliform bacteria and chlorine. These criteria are presently being revised in accordance with the comments received and will be available for use by the States in the development of water quality standards and the related disinfection requirements for publicly owned treatment works.

The benefits achieved by disinfection should be weighed against the environmental risks and costs. It is intended that the use of chlorine disinfection would be considered only when there are public health hazards to be controlled. The exclusive use of chlorine for disinfection should not be continued where protection of aquatic life is of primary consideration. Alternate means of disinfection and disinfectant control (dechlorination) must be considered where public health hazards and potential adverse impact on the aquatic and human environments co-exist. Disinfection should not be required in those instances where benefits are not present.

A preliminary Task Force Report has been prepared to provide a compilation of the existing technical and scientific data related to the issues raised by wastewater disinfection. The report is divided into four main parts—Summary, Conclusions and Recommendations; Public Health Effects and Considerations; Toxic Effects on the Aquatic Environment; and Disinfection Process Alternatives. Also included in the report is a summary of the Agency's ongoing research and development program in the area of wastewater disinfection and alternate means of disinfection. A copy of the Task Force report is available for inspection at the EPA Freedom of Information Center, Room 202, West Tower, Waterside Mall in Washington, D.C. and at all EPA Regional Offices. A limited number of copies of the report are available. Persons wishing to obtain a copy may write the Director, Municipal Construction Division, Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460. The Task Force report will be finalized upon completion of proposed action and will be available from the U.S. Government Printing Office at that time.

Interested members of the public are invited to comment on the proposed wastewater disinfection policy by written submissions to the U.S. Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460, Office of Water Program Operations (WH-447). Prior to adoption of the proposed policy in final form, all comments received on or before October 14, 1975 will be carefully considered.

All comments received may be inspected at the above location during normal working hours by interested members of the public. If, during the period for written submissions, it is deemed necessary that public hearings be held, notice of such hearings will be published in the FEDERAL REGISTER.

Dated: August 6, 1975.

JOHN QUARLES,
Acting Administrator.

[FR Doc.75-21370 Filed 8-14-75;8:45 am]